

# PATENT SPECIFICATION

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DRAWINGS ATTACHED

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## (54) TRANSPORT BOX OF PLASTICS MATERIAL

(71) We, VEREINIGTE DEUTSCHE METALLWERKE AKTIENGESELLSCHAFT, Zeilweg, 6 Frankfurt-on-the-Main-Heddernheim, Germany, a body corporate organised under the laws of Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a box which consists of plastics material and has hinged side walls, which can be turned outwardly into the plane of the bottom of the box so that space is saved when the empty boxes are being transported and stored.

In boxes of this kind, which have been previously proposed and which consist of plastics material, a series of arcuate apertures are formed in corner portions of the hinged side walls and receive locking cams when the box is being erected. This joint is highly reliable as such but has the disadvantage that the corner portions of the box are fixed only at points adjacent to the arcuate apertures. Another disadvantage of the previously proposed boxes of plastics material resides in that the arcuate apertures in the walls of the box constitute inevitable holes which are provided throughout the height of the box and of such a size that various materials having a relatively small size cannot be held by the box.

According to the present invention there is provided a plastics material box for transport and storage, wherein the box has side walls hinged to the box bottom and which can be turned outwardly into the plane of the box bottom, one edge of a pair of adjacent side wall edges having a portion bent at right-angles to the respective side wall for receiving outwardly directed elements of the other edge bent at right-angles to their respective side wall, whereby the

side walls can be interconnected when the box is erected, and wherein the walls which have the first-mentioned bent portions are formed adjacent each portion and at least in their upper region with a projection, which extends into the interior of the box and is adapted to interlock with the respective edge having the outwardly directed elements of the adjacent wall in the erected box.

This arrangement inherently locks the corner portion of a box of plastics material and does not only avoid relatively large apertures in the box wall but permits the box to be erected in a simple manner. It also permits the locking means to be formed during the manufacture of the wall and integrally therewith. When erecting the box, the edge of one wall is pulled over the projection during the insertion of the outwardly directed elements of such an edge into the first-mentioned bent portion of the adjoining wall. In the case of frequent use, this may result in damage to the respective edges of the box wall. In order to avoid such damage, the projection is preferably resilient. This may be accomplished in a simple manner by providing a U-shaped or arcuate slit in the respective portion of the wall, to form a tongue. The resulting tongue projection within the wall must be arranged so that its free end edge rises at an acute angle to the side wall from which it projects into the interior of the box. In this case, the end edge of the projection may be used to lock the outwardly directed elements of the edge of the adjacent wall within the bent portion of the edge of the wall in which the projection is located. The tongue yields resiliently during erection and need only be urged outwardly when the box is to be unfolded. This arrangement provides means for interlocking the box corners which means can be operated very easily and even

[Price 5s. Od. (25p)]

in frequent use do not suffer fatigue nor result in any damage to parts of the box of plastics material.

The bent portion of the side wall may be bent inwardly at right-angles to its respective wall, in a manner such that U-shaped bends are formed for receiving the outwardly directed elements of the edge of the adjacent wall.

For a simpler and more compact design, a side wall of the box may have at its edges a portion bent at right angles thereto, in which at least one aperture is formed, which during the erection of the box receives an outwardly directed element of the edge of the adjacent wall of the box, whereafter the projection provided in the wall which has the apertured-portion springs inwardly to bear against the adjacent side wall behind the portion of the wall on which the outwardly directed element is located. This design has the advantage that it enables the corner portions of the box to be simpler and more compact. In addition, owing to the presence of the aperture, the edge portion of the respective wall may be formed without the free end of the U-shaped portion of the inward bend.

The box may be made still more compact by displacing inwardly the portion of the wall having the outwardly directed elements bent at right-angles to that wall, so that the respective wall and the portion of the adjacent wall bent at right-angles to the respective wall lie in one plane when the box is erected so that the surfaces of the box are almost smooth throughout, even near the corners.

The arrangement of the connecting elements and their numerical distribution over the height of the box depend on the strength requirements which are to be met by the respective box.

Because the present boxes exhibit a high stability in use, when the walls are erected, they may be used for heavy materials, e.g., for the transport of liquids in containers, such as bottles. They are particularly desirable for the transport of disposable bottles because they can be transported back in an unfolded condition occupying a very small space.

Bottles, milk bags and the like require special supporting means within the box so that they will not tumble, break or burst in transit. Such supports may consist, e.g. of conical projections, which are secured in known manner to the box bottom in a regular spacing arrangement and have a shape which conforms to the material to be carried. Such projections generally require a large space during their return transportation because they act as spacers between the flattened boxes. To ensure that the advantage afforded by the unfolding of the transport container is not entirely eliminated by the provision of such spacers, the projections which are secured to the box bottom or integrally formed therewith may be made suitably high and open on the underside of the box bottom and their cavity be suitably made to conform to their exterior surface so that the projections in one box can extend substantially into the cavity of the overlying box when the unfolded transport containers are stacked.

The saving of transport space will be greater, the more exactly the exterior surfaces of the projections conform to their cavities. Particularly with boxes of plastics material, however, this has the disadvantage that it is difficult subsequently to separate the boxes. In order to avoid this disadvantage, concentric apertures are formed at the apices of the projections provided on the box bottom so that the air spaces formed in the projections when the containers are stacked are connected to the atmosphere. These apertures permit the boxes to be cleaned and prevent dirt from collecting in corners. These apertures have the additional advantage that a number of unfolded containers can be threaded on mandrels and can easily be carried in this condition.

In the direction of the side walls, the material in the container is suitably held by projections provided in the side walls and consisting particularly of cones or truncated pyramids. Care must be taken that these projections are sufficiently spaced from the bottom of the box so that the interlocking is not obstructed. The projections formed in the side walls should also be designed to fit mating cavities of the overlying unfolded containers.

In order to enable the invention to be more readily understood, reference will now be made to the accompanying drawings, which illustrate diagrammatically and by way of example some embodiments thereof, and in which:—

Fig. 1 is a fragmentary elevational view showing, partly in section, the interior of a corner of a plastics material box.

Fig. 2 is a sectional view taken on the line II—II in Fig. 1.

Fig. 3 is a fragmentary sectional view showing another embodiment of a detail of the box of Fig. 1.

Fig. 4 is a fragmentary view showing an upper corner portion of a plastics material box having a right-angled inwardly bent portion of an edge of one wall.

Fig. 5 is a sectional view taken on the line V—V in Fig. 4.

Fig. 6 is similar to Fig. 5 but shows a portion of a wall having a right-angled, outwardly directed edge portion which is offset inwards in plane parallelism,

Fig. 7 is a sectional view showing the bottom and one side wall of a plastics material box formed with projections for the transportation of bottles.

5 Fig. 8 is a top plan view showing the plastics material box of Fig. 7, and

Fig. 9 is a fragmentary sectional view taken on the line IX—IX in Fig. 8.

Referring now to Figs. 1 and 2, there is  
10 shown part of a plastics material box, a wall 1 of which is formed in its upper portion with a projection 2, which extends into the interior of the box. A free end edge 3 of the projection 2 serves to hold the adjacent wall 4 of the box in the illustrated position. The wall 4 has an outwardly directed edge element bent at right-angles thereof, which as shown in Fig. 2 interengages with a U-shaped inwardly bent portion  
15 of an edge 5 of the wall 1. The projection 2 shown in Figs. 1 and 2 is formed in a simple manner by a U-shaped slit 6 in the wall 1. In the manufacture of the box, care must be taken that the projection 2 is slightly inwardly directed, as is shown in Fig. 2, so that its end edge 3 can bear on the wall 4. The wall 4 is released so that the box can be collapsed when the projection 2 is bent into the plane of the wall 4.  
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30 The part of the box shown in Fig. 3, is formed with a simple projection 7. In this embodiment, the slit 6 of Fig. 1 may be omitted. For this design it is preferred to use a more flexible plastics material to avoid damage due to wear in repeated use. Finally,  
35 the box walls may be locked by a plurality of projections 2 or projections 7, preferably three to four of such projections, which are spaced over the height of the box. The number of such projections will depend upon the height of the box. Finally, the projections are not restricted to the shapes which are shown. To avoid damage to the material to be carried, the projections may  
40 have the form of a semicircular arc or of a bead.

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In the embodiments shown in Figs. 4 and 5, an edge of the wall 1 of the box is formed with an inwardly directed portion 8 bent at right-angles to the wall 2, in which an aperture 9 is formed for receiving, during the erection of the box, a right-angled, outwardly directed element of an edge 10 of the adjacent wall 4 bent at right-angles thereto. This connection is locked by a projection 11, an end edge 12 of which snaps in and presses against the inside of the wall 4 behind the portion 10. The arrow C indicates the direction in which the wall  
50 4 is moved for securing it to the adjacent wall 1. Referring to Figs. 4 and 5, it can be seen that the box can be erected by folding the walls 4 inwards into a plane above the plane of the box bottom. The  
55 walls 1 are folded inwardly until each is per-

pendicular to the bottom. The walls 4 can then be moved outwards in the direction of arrow C, depressing the projections 11 as they pass over them, until the edge element 10 is received in the aperture 9 of the inwardly bent portion 8. The walls 4 are locked in position by the projections 11 which rest against the inside of the wall 4 behind the edge element 10.

The embodiment shown in Fig. 6 is similar to that shown in Figs. 4 and 5, but a portion 13 of the wall which carries the outwardly directed edge element 10 bent at right-angles to the respective wall is inwardly offset so that the inwardly bent portion 8 and the wall 4 lie in one plane.

In the embodiments shown in Figs. 7 and 8, projections 15 are formed in the bottom 14 of the box and serve to locate bottles or the like. In Fig. 7, the projections 15 are hollow, being formed with a cavity 16, which is open at its lower end and conforms to the exterior surface 17 of the projections 15 so that similar projections can substantially extend into the cavity for storage purposes. To facilitate the fitting and to prevent the formation of cavities which are sealed from the outside and could render the separation of the stacked boxes more difficult, the elevations 15 have central apertures 18. Elevations 19 are provided on the inside surfaces of the box walls 4. These elevations 19 serve to retain the bottles or the like between the elevations 15 and the outside walls 4 and may also have apertures 18 (not shown). In Fig. 8, the dash-line circles indicate the positions of bottles which are inserted into the plastics material boxes. Fig. 9 shows a mandrel 21, on which a plurality of unfolded boxes of the kind shown in Figs. 7 and 8 may be threaded. The mandrel 21 may be secured to a pallet 22 to prevent plastics material boxes which are unfolded and stacked on the mandrel from slipping.

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#### WHAT WE CLAIM IS:—

1. A plastics material box for transport and storage, wherein the box has side walls hinged to the box bottom and which can be turned outwardly into the plane of the box bottom, one edge of a pair of adjacent side wall edges having a portion bent at right-angles to the respective side wall for receiving outwardly directed elements of the other edge bent at right-angles to their respective side wall, whereby the side walls can be interconnected when the box is erected, and wherein the walls which have the first-mentioned bent portions are formed adjacent each portion and at least in their upper region with a projection which extends into the interior of the box and is adapted to interlock with the respective edge having the outwardly directed ele-

ments of the adjacent wall in the erected box.

2. A plastics material box as claimed in claim 1, wherein the projection has the shape of a wedge in cross-section and its end edge serves as a stop for the box wall to be locked.

3. A plastics material box as claimed in claim 1, wherein the projection consists of a tongue, which extends at an acute angle to the side wall from which it projects into the interior of the box and is formed by a slit in the respective portion of the box wall.

15 4. A plastics material box as claimed in any one of claims 1 to 3, wherein the first-mentioned bent portion at right-angles to the side wall on which it is formed has at least one aperture for receiving one of 20 the outwardly directed elements of the other edge, when the box is erected.

25 5. A plastics material box as claimed in claim 4, wherein the portion of the wall at the edge of which the outwardly directed elements are located is inwardly offset so

that the remaining portion of that wall and the first-mentioned bent portion of the adjacent wall lie in one plane in the erected box.

6. A plastics material box as claimed in any one of claims 1 to 5, wherein the bottom of the box has projections which are hollow and form cavities which are open at their lower ends and conform to the exterior surfaces of the projections.

7. A plastics material box as claimed in claim 6, wherein central apertures are formed in the tops of the projections.

8. A plastics material box substantially as hereinbefore described with reference to Figs. 1 and 2, or Fig. 3, or Figs. 4 and 5, or Fig. 6, or Figs. 7 to 9 of the accompanying drawings.

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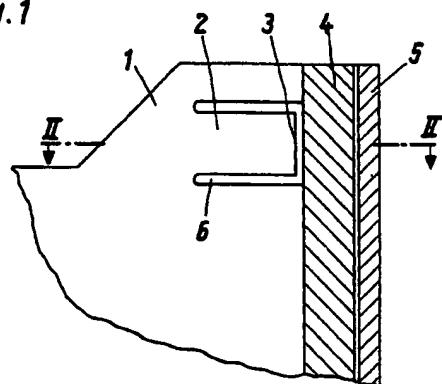
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COMPLETE SPECIFICATION

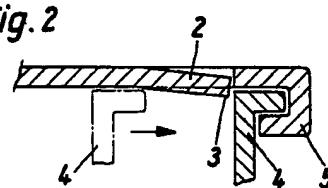
4 SHEETS

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Sheet 1*

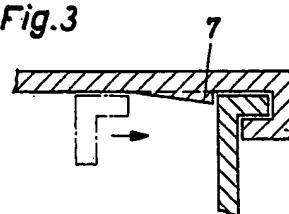
*Fig.1*



*Fig. 2*



*Fig. 3*



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Fig.4

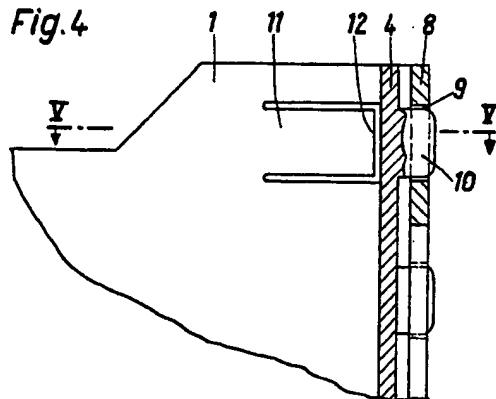


Fig.5

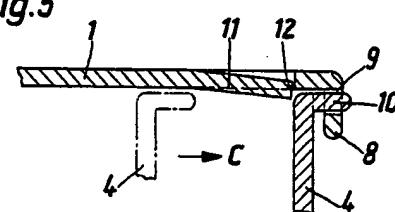
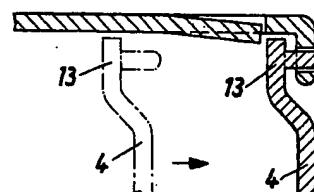


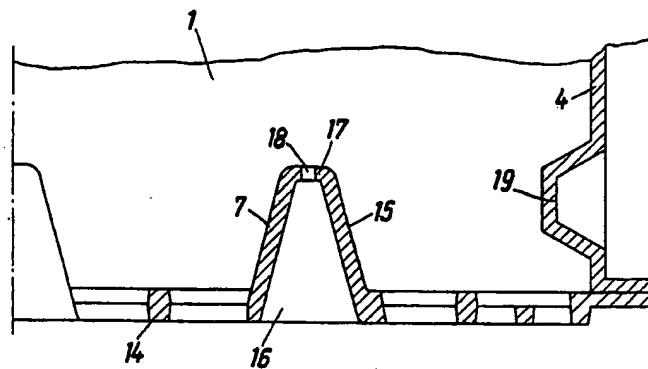
Fig.6



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*Fig. 7*



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Fig.8

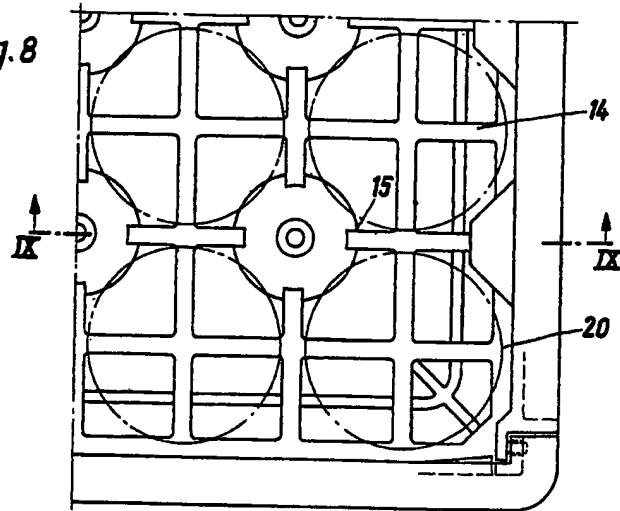


Fig.9

